

## **REMARKS**

Claims 1-3 have been amended. The amendments are supported by the specification on page 8, lines 19-20. No new matter has been introduced. Claims 1-12 are pending in this application. Claim 11 has been withdrawn from consideration. Allowance of all pending claims is respectfully requested.

### **Rejections under 35 U.S.C. § 103**

Claims 1-10, and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over EP0619268 (Hereinafter "EP '268"), in view of U.S. Patent No. 6,290,927 to Wold (hereinafter "Wold") and U.S. Patent No. 5,026,535 to Jonsson et al. (hereinafter "Jonsson"), optionally further in view of U.S. Patent No. 5,000,858 to Manning et al. (hereinafter "Manning"), for reasons stated on pages 2-5 of the Office Action. Applicants respectfully traverse the rejection.

To establish a *prima facie* case of obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 165 USPQ 494, 496 (CCPA 1970).

In addition, when applying 35 U.S.C. § 103, the following tenets of patent law must be adhered to: (A) The claimed invention must be considered as a whole; (B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (D) Reasonable expectation of success is the standard with which obviousness is determined. Hodosh v. Block Drug Co., Inc., 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).

Independent Claim 1, as amended, is directed to a method for recovering hydrogen chloride from chlorine based waste which comprises adding water and a reducing agent to an acid

gas obtained by the combustion of chlorine based waste to effect reaction to obtain a crude hydrogen chloride aqueous solution having an oxidation-reduction potential of 600-850 mV and then, distilling the crude hydrogen chloride aqueous solution to obtain a purified hydrogen chloride gas. Independent Claim 12 is directed to a method for recovering hydrogen chloride from chlorine based waste which comprises adding water and a reducing agent to a gas obtained by the combustion of chlorine based waste to effect reaction to obtain a crude hydrogen chloride aqueous solution having an oxidation-reduction potential of 600 to 850 mV by using an oxidation-reduction potential automatic control means for measuring the oxidation-reduction potential of the crude hydrogen chloride aqueous solution and automatically controlling the amount of the reducing agent and then, pressure distilling the crude hydrogen chloride aqueous solution to obtain a purified hydrogen chloride gas. As described in the specification, the reducing agent can be a nitrogen based compound such as hydrazine, or a sulfur based compound such as a sulfide.

The Examiner alleges that EP '268 teaches the use of a reducing agent (hydrazine, ammonium bisulfite, or ammonium sulfite) in the process for producing hydrogen chloride from chlorous waste material. Applicants respectfully submit that EP '268 only teaches using hydrazine after the optional step of pretreating the raw acid with an oxidation agent (col. 6, lines 21-47). Specifically, if the raw acid contains high concentrations of HBr and HI, EP '268 describes a method for reducing the HBr and HI content by oxidizing HBr and HI with  $H_2O_2$ , and then separating the resulting  $Br_2$  and  $I_2$  using a segmented distillation column. One skilled in the art would understand that the oxidation process also results in the production of  $Cl_2$  from HCl and the presence of excess  $H_2O_2$  (oxidation agent), and that hydrazine is used after the pretreatment step to convert  $Cl_2$  back to HCl, and  $H_2O_2$  back to  $H_2O$ . Therefore, EP '268 does not teach or suggest using hydrazine in a process without the oxidation step.

Applicants further submit that EP '268 does not teach or suggest using ammonium bisulfite or ammonium sulfite for the treatment of raw acid before the distillation step. EP '268 describes the use of ammonium bisulfite or ammonium sulfite in the treatment of waste flue gas in order to eliminate molecular halogens before releasing the flue gas to the environment (col. 3, lines 14-21). The waste treatment process is a step employed after the production of the hydrochloric acid itself.

Finally, EP '268 does not teach or suggest using oxidation-reduction potential as a measurement for the treatment of raw acid. In fact, oxidation-reduction potential is not even mentioned in EP '268.

Wold, Jonsson, and Manning do not cure the defect of EP' 268. Wold is cited as teaching an oxidation-reduction potential of less than 900 mV (page 3, line 16 to page 4, line 4 of the Office Action). Wold describes a method of removing iron and halogen coloring materials from hydrochloric acid by adding a nitrogen containing reducing agent. Wold describes, in Example 2, that the level of halogens in the final hydrochloric acid is desired to be lower than 1 ppm. The Examiner thus alleges that Wold teaches an oxidation-reduction potential of 900 mV as required in instant Claim 1, because the oxidation-reduction potential of a hydrochloric acid solution with halogen content at a level lower than 1 ppm would inherently be lower than 900 mV. Applicants respectfully disagree.

First, Wold teaches that the level of halogens in the final hydrochloric acid is desired to be lower than 1 ppm. The instant claims describe maintaining an oxidation-reduction potential of 600-850mV in a crude hydrogen chloride solution before distillation. Therefore, the condition described in Wold simply does not apply to the instant claims.

Moreover, one skilled in the art understands that a halogen content at a level lower than 1 ppm does not guarantee an oxidation-reduction potential of less than 900 mV or, with respect to

the amended Claim 1, within the range of 600-850mV. It should be noted that under the condition recited in amended Claim 1, i.e., a crude hydrogen chloride solution having an oxidation-reduction potential of 600-850mV, the concentration of  $\text{Cl}_2$  can never be more than 1 ppm. The examples of the instant invention show concentration of  $\text{Cl}_2$  at a level below 0.1 ppm (the specification provides that no  $\text{Cl}_2$  was detected by the o-tolidine colorimetric analysis (page 20, line 7-8), which has a detection limit of 0.1 ppm). However, if another oxidizing agent such as  $\text{H}_2\text{O}_2$  is added under this condition, the oxidation-reduction potential may be well above 850mV, while the  $\text{Cl}_2$  concentration is still below 1 ppm. In other words, a hydrochloric acid solution having an oxidation-reduction potential of 600-850mV inherently has a halogen level lower than 1 ppm, but a hydrochloric acid solution having a halogen level lower than 1 ppm does not inherently have an oxidation-reduction potential of 600-850mV.

In addition, Wold neither teaches nor suggests the appropriate values of oxidation-reduction potential of crude hydrogen chloride solution or a method for controlling the value.

Jonsson is cited against independent Claim 12 for its teaching of an automatic controlling step (page 4, lines 9-18 of the Office Action). It relates to a method for decoloring sulphuric acid using  $\text{H}_2\text{O}_2$ . Jonsson suggests that  $\text{H}_2\text{O}_2$  addition may be controlled automatically with respect to the acid produced. Jonsson, however, does not mention how to accomplish the automation. Since Jonsson only teaches the correlation between color reduction and the amount of  $\text{H}_2\text{O}_2$  added to the sulphuric acid, the automation, if any, should be based on the measurement of color index but not oxidation-reduction potential, which is not even mentioned in Jonsson.

Manning is cited as a reference teaching that the amount of reducing agent to be added to a process can be controlled by measuring and monitoring the oxidation-reduction potential (page 5, lines 1-3 of the Office Action). Manning relates to a system and method for removing heavy metals, such as hexavalent chromium, from water. Because oxidation-reduction potential has

been widely used as a measurement of water quality, Manning describes using an oxidation-reduction potential detector to monitor the metal removing process. The water treatment process, however, is totally different from the production process of hydrogen chloride as described in the instant claims.

Taken together, Applicants respectfully submit that the Examiner has not established the requisite motivation or suggestion for the proposed combination of references. Specifically, the Examiner has not established why one of ordinary skill in the art would have desired to obtain a crude hydrogen chloride solution having a certain oxidation-reduction potential when none of the references teaches using oxidation-reduction potential as a measurement in the process of producing hydrochloric acid. Moreover, the claimed range of oxidation-reduction potential would not be predictable in the art, especially for a crude hydrogen chloride solution before distillation, as recited in Claims 1 and 12 here. Accordingly, Applicants respectfully submit that EP '268, Wold, Jonsson, and Manning, individually and in combination, do not render Claims 1 and 12 obvious.

If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. In re Fine, 5 USPQ2d 1596 (Fed Cir. 1988). Accordingly, dependent Claims 2-10 are patentable because they depend from Claim 1 and define additional patentable subject matter. Withdrawal of the 35 U.S.C. § 103 rejection to Claims 1-10 and 12 is respectfully requested.

In view of the foregoing remarks, favorable reconsideration of all pending claims is requested. Applicants respectfully submit that this application is in condition for allowance and requests that a notice of allowance be issued. Should the Examiner believe that anything further is required to expedite the prosecution of this application or further clarify the issues, the Examiner is requested to contact Applicants representative at the telephone number listed below.

Respectfully submitted,

PIPER RUDNICK LLP

A handwritten signature in cursive script, appearing to read "Michael Ye", is written over a horizontal line.

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